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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/833,543	04/11/2001	Erik D. Lindskog	A-69116/AJT	4785
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FLEHR HOHBACH TEST ALBRITTON & HERBERT LLP Suite 3400 Four Embarcadero Center San Francisco, CA 94111-4187			EXAMINER WANG, TED M	
			ART UNIT 2634	PAPER NUMBER
DATE MAILED: 10/20/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/833,543	Applicant(s) LINDSKOG ET AL.	
	Examiner Ted M Wang	Art Unit 2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 April 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 5-10, 12, 14-32, 33/12, and 34/5 is/are rejected.
- 7) ☒ Claim(s) 2-4, 11, 13, 33/11, 34/2, and 34/3 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>6/20/01, 4/29/02</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

(1) On page 2 line 7, the examiner suggests changing "(1, 2)" to "[1, 2]" in order to make it consistent to the whole disclosure and not to confuse with the equations, such as (1), (2), ..., etc, cited by the applicant.

(2) On page 15 line 1, delete "is" next to "(32)".

Appropriate correction is required.

Claim Objections

2. Claims 2 and 4 are objected to because of the following informalities:

(1) In claims 2 and 4 line 5, "the transmission frame" should be changed to "a transmission frame".

(2) Claims 26 and 27 are objected to as being a substantial duplicate of claims 20 and 21 respectively.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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4. Claims 1, 6, 16, and 23-25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

(1) In regard claim 1, the limitation of "storing the received signal" has not been taught in the specification.

(2) In regard claims 6, the limitation of "wherein the step of dividing symbols further comprises the step of assigning symbols to the first symbol stream and the second symbol stream in a *random fashion* with respect to each symbol value." as recited has not been taught in the specification. The specification only teaches "it is possible to have different arrangements of the symbols in different number of streams and it is possible to divide a transmission frame into a different number of blocks, it is possible to apply the time-reversal, complex conjugation and negation in different fashions to these blocks while still achieving the same final goal," as recited.

(3) In regard claims 16 and claims 23-25 have the same issue as described in above (claim 6).

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Regarding claim 14 and 32, the phrase "otherwise" renders the claim indefinite because the condition has not been clearly pointed out in the claims. i.e. what does the "otherwise" mean?

7. Claims 5-10, 12, 15-18, 28/15, 29/28/15, 30, 30, 31, 33/12/11/2, and 34/5 are rejected under 35 U.S.C. 112, second paragraph, because the claims do not properly define either the method or the apparatus disclosed.

(1) In regard claims 5, it defines a method claim with "A method for processing and transmitting a signal comprising a plurality of symbols", but concludes with a system claim "the system comprising a first and a second spaced antennas coupled to a transmitter" as recited. The claims 5-8 and 34/5, respectively, as a whole is neither a definition of a method nor of a system but is instead a hybrid of the two.

(2) In regard claim 9, it defines a method claim with "The method of claim 5 wherein the method for processing and transmitting a signal ", but concludes with an apparatus claim "further comprises a first and a second group of spaced antennas, each group comprising a plurality of antennas" as recited. The claims 9 and 10, respectively, as a whole is neither a definition of a method nor of an apparatus but is instead a hybrid of the two.

(3) In regard claim 12, it defines a method claim with "The method of claim 11 wherein the step of filtering", but concludes with an apparatus claim "further comprises a matched filter" as recited. The claims 12 and 33/12/11/2,

respectively, as a whole is neither a definition of a method nor of an apparatus but is instead a hybrid of the two.

(4) In regard claims 15, it defines a method claim with "A method for transmitting data while reducing the effects of fading and handling intersymbol interference efficiently", but concludes with a system claim "a transmitting station including: (a) a first antenna and a second antenna; and (b) an encoder coupled to the first and second antennas" as recited. The claims 15-18, 28/15, and 29/28/15, respectively, as a whole is neither a definition of a method nor of a system but is instead a hybrid of the two.

(5) In regard claim 30, it has the same issue as that of claim 12 as described above.

(6) In regard claim 31, which is a system claim, is depended to a method claim 30. The claim 31 as a whole is neither a definition of a system nor of a method but is instead a hybrid of the two.

8. Claim 5 recites the limitation "the system comprising" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

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The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

10. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Jones et al. (US6,128,351).

For further examination the examiner examines all limitation in claim 1 including the issue as described above (paragraph 4).

As shown in figures 4 and 7, Jones et al. discloses a method for bi-directional demodulation of digital modulated signals comprising steps of:

(1) with regard to claim 1:

time-reversing the original signal (Fig.4 elements 68-70, column 1 lines 14-29, and column 4 lines 39-58);

transmitting the time-reversed signal over the channel (Fig.4 and column 4 lines 6-21);

time-reversing the received signal (Fig.7 element 102, column 2 lines 6-10, and column 6 lines 16-39);

storing and time-reversing the received signal (Fig.1 element 10 and column 3 lines 11-42.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claim 19, 20, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alamounti et al. (US6,185,258) in view of Benning et al. (US6,594,226).

(2) with regard to claim 19:

As shown in figures 1 and 3, Alamounti et al. discloses a wireless communication system that

(a) a first antenna and a second antenna (Fig.1 elements 11 and 12);

(b) an encoder (Fig.1 element 10) coupled to the first and second antenna (Fig.1 elements 11 and 12) and adapted to divide a signal into a first and a second symbol stream, each symbol stream having a plurality of symbols (column 3 line 60 – column 4 line 22, and column 8 claim 5),

the encoder adapted to transmit the first symbol stream through the first antenna group using a delay diversity technique during a first block of a frame (column 1 line 63 – column 2 line 8),

to transmit the second symbol stream through the second antenna group using a delay diversity technique during a first block of a frame (column 1 line 63 – column 2 line 8 and column 8 claim 6);

and to transmit through the second antenna group a time reversed and complex conjugate form of the first symbol stream during a second block of a frame (column 1 line 63 – column 2 line 8), and to transmit through the first antenna group a time reversed complex conjugate and negated form of the second symbol stream during a

second block of a frame (column 8 claim 6 and column 1 line 63 – column 2 line 8)

Alamonti et al. discloses all of the subject matter as described above except for specifically teaching that a first antenna group and a second antenna group, each group comprising a plurality of antennas.

However, Benning et al. teaches that an apparatus for enhancing diversity gain without reducing data rate by increasing the number of antenna elements comprising a first antenna group (Fig.2 elements 21-1 and 24-2, Abstract lines 1-16, column 2 line 52 – column 3 line 17, and column 3 line 50 – column 4 line 27) and a second antenna group (Fig.2 elements 21-1 and 24-2, Abstract lines 1-16, column 2 line 52 – column 3 line 17, and column 3 line 50 – column 4 line 27), each group comprising a plurality of antennas (Fig.2 elements 21-1 and 24-2) so that the signal to noise (SNR) is improved. It is desirable to increase the number of antenna elements at transmitter. The reason for this is if space time spreading (STS) is involved in data transmitting, the transmitter does not scale naturally to more than two antenna elements to enhance diversity gain without having to reduce data rate; on the other hand, if the antenna array is adapted in a transmitter, it can be configured as described in column 3 line 66 – column 4 line 9 to provide for N-fold diversity gain and average M-fold signal-to-noise ratio improvement without reducing the data rate well-known in the art. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus as taught by Benning et al. in which an antenna array is adapted at transmitter into Alamonti's transmitter so as to improve the signal to noise ratio at receiver side without reducing the data rate.

(3) With regard to claim 20:

The limitation that the antennas within each group are spaced apart from one another could further be taught by Benning et al. in Abstract lines 1-16, column 2 lines 52-63, column 4 lines 11-27.

(4) With regard to claim 22:

The limitation that a first and a second antenna within the first antenna group (Fig.2 elements 24-1 and 24-2) could further be taught by Benning et al. All other limitation is contained in claim 19. The explanation of all the limitation is already addressed in the above paragraph.

13. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alamounti et al. (US6,185,258) and Benning et al. (US6,594,226) as applied to claim 20 above, and further in view of Golemon et al. (U.S. Provisional Application 60/157,290).

(1) With regard to claim 21:

Alamounti et al. and Benning et al. disclose all limitation as described above except for specifically teaching that the antennas within each group have polarizations different from one another.

However Golemon et al. teaches a wireless communication system that the antennas within each group have polarizations different from one another (page 7 line 22 – page 8 line 5 and page 18 column 1).

It is desirable to have an antenna system that provides multiple signal diversity in a unitary package and combines a time delayed version of the transmit signal with an orthogonal polarized antenna to provide a second uncorrelated, delayed signal that is

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coherently added by the channel compensation techniques of the mobile unit. The reason for this is if the signal is transmitted without polarization, the fast signal fading could not be solved and the coverage of the base station is limited; on the other hand, have polarizations different from one another (antennas) will activate the antenna architectures to enable the maximum limit of RF power to be employed while simultaneously providing a balanced link at either a greater distance from the base station or deeper into buildings than is currently possible with the same base station locations (page 7 lines 3-21) well-known in the art. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the system as taught by Golemon et al. in which different polarization transmitting antenna array is adapted to the transmission system of the Alamouti et al. and Benning et al. so as to improve system performance and increase data transmission rates.

14. Claims 28/19 and 29/28/19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alamouti et al. (US6,185,258) and Benning et al. (US6,594,226) as applied to claim 19 above, and further in view of Monsen (US 4,733,402).

(2) With regard to claim 28/19:

As shown in figures 1 and 3, Alamouti et al. and Benning et al. disclose all limitation as described in claim 19 and (a) an antenna adapted to receive symbols from a transmission (Fig.1 element 20).

Alamouti et al. and Benning et al. disclose all of the subject matter as described above except for specifically teaching that a combining filter coupled to the antenna and

adapted to receive symbols through the antenna from the first block and the second block wherein the combining filter generates a time reversed and complex conjugate form of the second block; and a matched filter coupled to the combining filter and adapted to receive the first block of the transmission and the time reversed, complex conjugate form of the second block and form a decoupled first and second output.

However, Monsen teaches an adaptive filter equalizer systems that

(b) a combining filter (Fig.1 elements 11-13) coupled to the antenna (column 3 lines 53-68) and adapted to receive symbols through the antenna (Fig.1 element 11-13 and column 3 line 63 – column 4 line 21); and

(c) a matched filter (Fig.1 elements 11-13 and column 3 line 63 – column 4 line 21) coupled to the combining filter.

It is desirable to have a combiner filter and match filter at the receiver side. The reason for this is that without them the maximum receiving signal could not be calculated to recover the original information. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the system as taught by Monsen in which having a combiner filter and match filter at the receiver side so as to improve the receiving signal quality with more inexpensive calculation circuit.

(3) With regard to claim 29/28/19:

The limitation that the system further comprises an equalizer adapted to resolve intersymbol interference can further be taught by Monsen in Fig.1 elements 11-13.

Allowable Subject Matter

15. Claims 2, 3, 4, 11, 13, 33/11/2, 34/2, and 34/3 would be allowable if rewritten or amended to overcome the objection set forth in this Office action.

Conclusion

16. Reference US 6,697,641 is cited because they are put pertinent to a transmitter system with an antenna array and delay diversity. However, none of references teach detailed connection as recited in claim.


17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M Wang whose telephone number is (571) 272-3053. The examiner can normally be reached on 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Ted M Wang
Examiner
Art Unit 2634

Ted M. Wang


CHIEH M. FAN
PRIMARY EXAMINER